



TerraLens

Fly the Earth with your hands and your voice. Bring any dataset you own. Read the source beside every number on screen.

aipower.guru/terralens
credentialed access

info@aionpl.com
access and enquiries

1 km
closest altitude, measured

A 3D geographic instrument you operate by hand, by voice, or by keyboard, on any dataset you own

TerraLens presents the Earth as one saturated object surrounded by hairline instrumentation. Point at a place and it flies there. Ask for a layer and it appears. Bring a dataset and it becomes a layer with its source printed beside it. Every number carries its method and provenance, and nothing is ever invented to fill a gap.

10

hand gestures, one and two handed, recognised on the device from a webcam

0

words or frames that leave the device. Speech and vision run in the browser

Any

vector or raster dataset, baked into a layer with its licence and generalisation disclosed

1 km

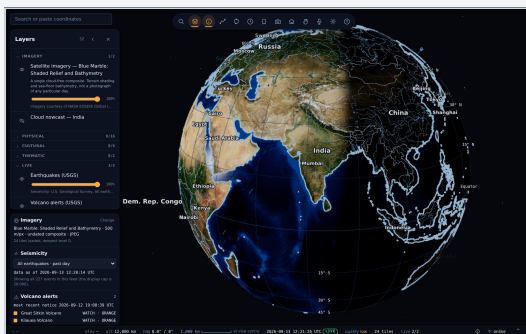
closest altitude, where roads and boundaries stay one pixel wide

16

India datasets already wired as layers, from glacial lakes to drone zones

11

basemaps: ten NASA imagery products plus the OpenStreetMap street map, down to the runway



basis live build, 13 Sep 2026. Blue Marble imagery, USGS seismicity, ISS ground track. The status bar reads altitude, heading, scale, data time and quality tier.

Runs anywhere, installs nowhere

A directory of files behind any static web server. No build, no account, no API key, no backend. It works on a laptop, a phone on a stand, or a wall display, and the bundled vector Earth renders complete with no network at all.

Fast because it reads binary

The globe is on screen inside a second. Vector data arrives as packed arrays, not text, and imagery, sun, and live feeds stream in behind an already usable Earth.

Honest by design

An unknown value prints a dash, never a zero. A stale feed says how stale it is. A layer without a stated source refuses to load.

Rule 1

Real data only

Nothing geographic is fabricated, interpolated to fill or placeholdered. If a source is unavailable, the interface says so in words.

Rule 2

No build step

Native web modules served as files. One committed data tool bakes datasets offline.

Rule 3

No keys, no server, no CDN

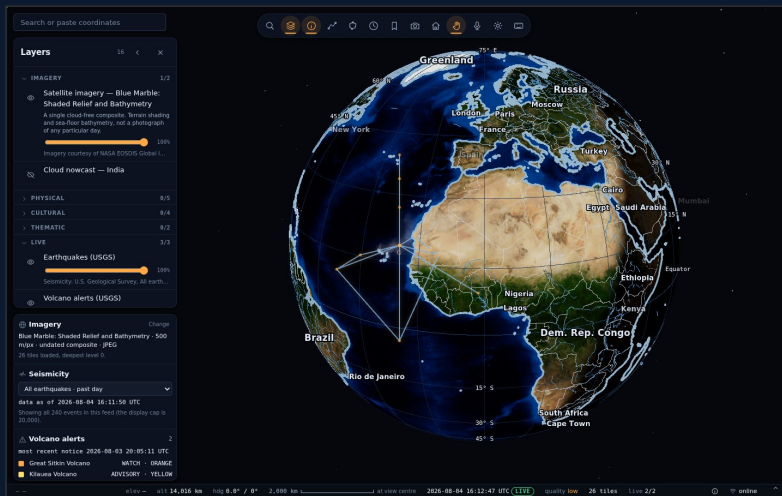
Every library is vendored. Nothing is loaded from a third party except the data you asked for.

Rule 4

Offline must work

With zero network the bundled vector Earth renders complete. Everything else is an enhancement.

Close a fist to grab the world. Say where you want to go.



basis live build, gesture overlay with the hand reticle and a measurement path, Aug 2026.

TerraLens watches your hands through an ordinary webcam and listens for its name through an ordinary microphone. Both run entirely inside the browser: the hand-landmark model, the geometric pose classifier, the speech recogniser and the voice that answers are all shipped with the app. No video and no audio ever leaves the device.

Gestures drive the same orbit controls the mouse does, after One-Euro smoothing, median filtering and time-based voting, so a hand feels like a hand and never fights the pointer. Camera access sits behind an explicit click, a short practice tutorial and a calibration step, and every gesture has a keyboard and mouse equivalent.

The gesture vocabulary

fist	grab and orbit the globe
pinch	pan across the surface
thumb up, thumb down	zoom in, zoom out
pinch and push	zoom by moving your hand toward the screen
point and dwell	select what you are pointing at
open palm	release, or hold to fly home
two-hand pinch	zoom with both hands
two-hand twist	rotate
two-fist grab	arcball the whole Earth

Things you can say

"TerraLens, fly to Bangalore"

any country, state or one of 7,342 places

"take me to twelve point nine seven seven north, seventy-seven point five nine east"

spoken coordinates

"show the power grid"

any layer by its plain name, show or hide

"zoom in a bit"

a bit, a little, a lot, or there

"what's that?"

names the feature under your hand

"measure"

starts a geodesic measurement

"dark mode please"

and stop listening please

The recogniser is built from phrases, not a bag of words, so natural phrasings land. Pointing and speaking combine: say "what's that" while pointing and the answer is about the thing under your finger.

On a phone the natural posture is docked on a stand, camera facing you, both hands free. The full vocabulary works there, two-hand moves included, and the layout holds down to a 375 px screen with the status bar always in view.

Hand TerraLens a dataset in the format you already have, and get a layer with its source printed on it

Roads from OpenStreetMap, rivers from HydroSHEDS, glacial lakes from a research inventory, drone zones from a regulator, forest masks from satellite classification: they arrived in five different formats and they all became TerraLens layers through the same pipeline.

GeoJSON

Shapefile

GeoPackage

OSM PBF

GeoTIFF / COG

CSV points

any format GDAL reads

1

Extract

Clip to your region and filter to what matters, with the threshold recorded. India's 255,319 HydroRIVERS reaches became 16,427 by stream order, and the number is in the manifest.

2

Bake

Rings and points are packed into the binary arrays the app reads, generalised to a tolerance derived from the renderer, and measured for worst-case deviation.

3

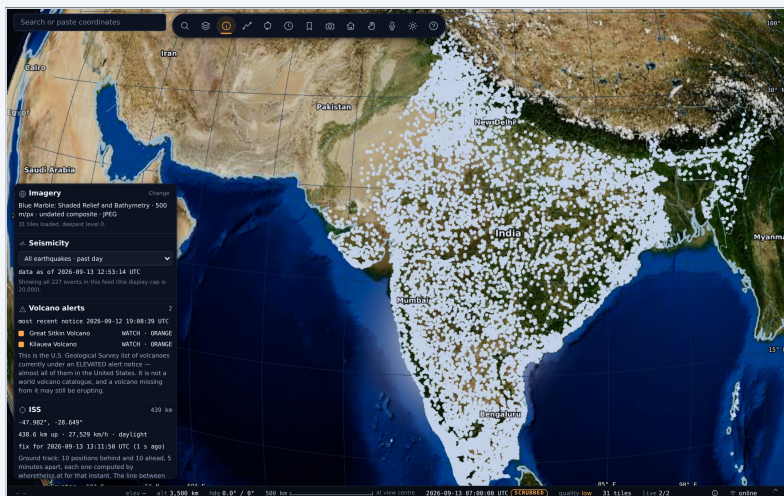
Declare

Every layer carries its title, source, licence, feature count and the date of its snapshot. A layer with no attribution refuses to load.

4

Switch on

The layer appears in the panel under its category, with an opacity slider and its provenance note, and can be shown by voice by its plain name.



basis live build, 13 Sep 2026. Every one of 50,062 hospitals from a 1.6 GB OpenStreetMap extract of India, drawn as a layer with its licence line, over Blue Marble at 3,500 km.

Rasters too

Cloud-optimised GeoTIFFs are read by range request on demand, so a 10 m forest mask covering a state drapes over the globe without being downloaded whole. Three Karnataka products, 741 tiles, are live today.

Time series are layers with dates

Ten annual glacial-lake inventories, 2008 to 2017, ship as ten layers so a change over a decade is a matter of toggling two of them.

Modelled data is labelled modelled

A predicted distribution grid draws in a different line style from a surveyed one, and its note says so. Two areas ship for every generalised polygon: the one drawn and the one in the source.

Your data stays yours

Private rasters sit behind a read-only, allow-listed proxy on your own host. Nothing is uploaded to a third party.

Six operations, each with a method it can defend

Measurement

Geodesic paths on WGS84 by Vincenty's formulas, drawn as true great-circle arcs with per-segment length and bearing. Polygon area by exact spherical excess on the authalic radius, verified against l'Huilier's theorem. Self-intersecting polygons are refused, not approximated. Export as GeoJSON or CSV.

Inspection and selection

Exact picking through a spherical point-in-polygon index. Hover outline, selection fill, a click to cycle coincident features, and an inspector with computed area, perimeter and centroid under a provenance badge.

Search

One gazetteer over every country, state and place, including alternate-language names. Type it, paste coordinates in any notation, or say it.

Choropleth

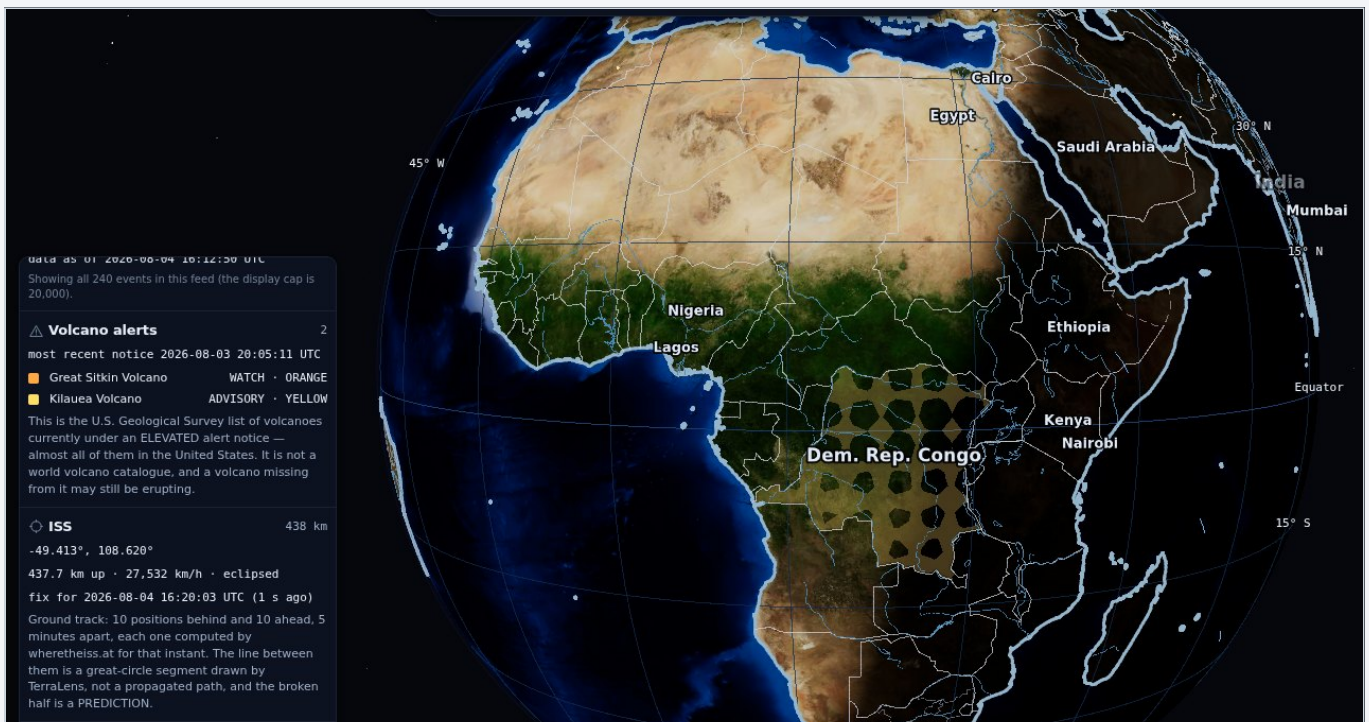
Field statistics discovered from the data. Equal-interval, quantile or Jenks breaks; a log-transform prompt on skewed fields; colour ramps verified for colour-vision deficiency. The legend shows real breaks and per-class counts, hatches no-data distinctly, and doubles as a filter.

Time

Earthquakes carry a temporal window with a histogram, cumulative or instant modes, UTC labels, and a "data as of" line.

State you can share

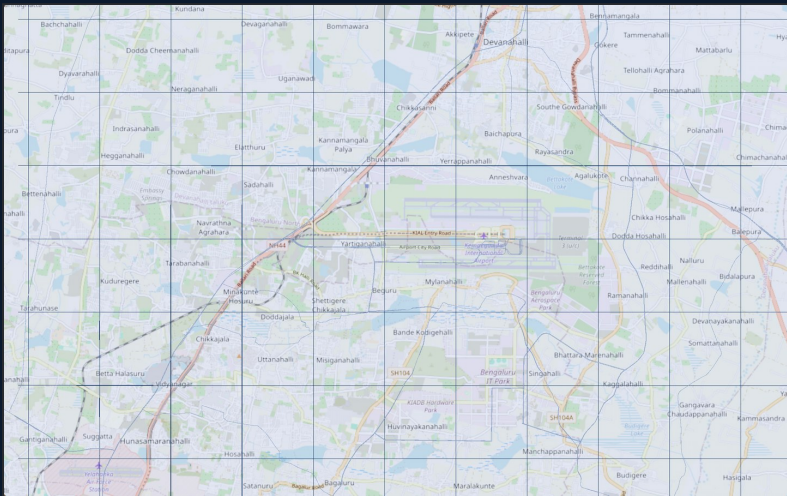
Camera, basemap, visible layers, thematic settings, time window and selection serialise into the URL. A bookmark is a link.



basis live build, 13 Sep 2026. The hatch over the selected polygon is the choropleth's distinct no-data class, drawn instead of a guessed value.

What it declines to do, and why. No elevation readout until a terrain source is on board, because a fabricated height would break Rule 1. No flat-map projection, because it would reintroduce the antimeridian and a second implementation of every pick and label. No interpolation across a gap in the data, ever.

Fly from the whole Earth to a single runway, and the lines stay sharp all the way down



basis live build, 14 Sep 2026, 15 km over Kempegowda International Airport on the OpenStreetMap street basemap. The hairlines are TerraLens's own road vectors, sitting on the map's roads to the pixel.

The camera descends to 1,000 m above the ground. Radial offsets scale with altitude, the near and far planes follow the horizon, and vectors are baked in double precision, so a road at one kilometre sits where the survey put it.

0.767 m/px

ground resolution at 1,000 m on a 1080 px display

0.0144 px

worst positional drift measured down the whole descent, against a 0.5 px threshold

14

imagery tile levels, to 0.48 m per pixel when a source can supply it

1,129

near-to-far depth ratio, so nothing flickers or fights at the surface

Stability was measured, not assumed: a verification tool tracks a graticule line by sub-pixel centroid at every altitude on the way down and reports the drift.



12,742 km · orbit



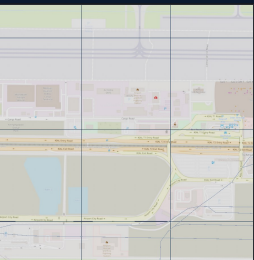
1,500 km · India



150 km · Karnataka



15 km · Bengaluru



1,000 m · the runway

basis live build, 14 Sep 2026, one flight from orbit to Kempegowda International Airport. Blue Marble imagery for the first two rungs; from 150 km down, the OpenStreetMap street basemap, warped onto the globe live. Major roads thin out by altitude on the way in; below 60 km the 3 m OpenStreetMap detail tier replaces the generalised lines. The 1,000 m rung is a square crop of the rendered frame.

Where the detail comes from. Open 10 m satellite imagery is at its natural scale around 13 km up. Below that, TerraLens keeps the picture crisp with vectors and a street basemap rather than stretched pixels: OpenStreetMap cartography is warped onto the globe live, roads, rivers, buffers and boundaries stay one pixel wide all the way to the ground, and your own high-resolution rasters can take over where you have them.

Sixteen India datasets already baked, credited and one click away



basis live build, 13 Sep 2026, 520 km over Karnataka. 2,836 transmission routes and 1,817 substations in amber, clipped to the state's real boundary rather than a bounding box.

Layer	Features	Source and licence, as printed in the app
Rivers (HydroRIVERS)	16,427	HydroRIVERS v1.0, Lehner and Grill (2013), HydroSHEDS
Glacial lakes, ten annual inventories 2008 to 2017 (Hi-MAG)	12,593 to 15,348	Hi-MAG glacial lake database, Chen et al. (2021), Earth System Science Data
Major roads (OSM)	401,943	OpenStreetMap contributors, ODbL
Hospitals (OSM)	50,062	OpenStreetMap contributors, ODbL
Aerodromes (OSM)	43	OpenStreetMap contributors, ODbL
Drone zones, red (central-government permission)	383	Restricted airspace buffers, DGCA Drone Rules 2021, via DroneGenie
Drone zones, yellow (conditional permission)	638	Restricted airspace buffers, DGCA Drone Rules 2021, via DroneGenie
Power grid, Karnataka: transmission routes and substations	2,836 and 1,817	OpenStreetMap power tags, clipped to the state boundary
Predicted distribution, Karnataka (modelled)	30,390	gridfinder, CC BY 4.0. Drawn dashed and labelled modelled
Forest, tree and perennial masks, Karnataka, 10 m	3 × 247 tiles	AgriAtlas cloud-optimised GeoTIFFs, read on demand
Reefs, ice shelves, seas, glaciers, urban areas, airports, ports, detailed rivers	8 layers	Natural Earth 1:10m and 1:50m, public domain

Each of these went through the same pipeline your own data would. The tolerance a layer was generalised to, the measured worst-case deviation and the source snapshot date all ship in its manifest entry and show in its panel note.

Ten NASA products, a real sun, and three feeds that tell you their age

NASA GIBS product

- Blue Marble: shaded relief and bathymetry
- Earth at Night (VIIRS, Suomi NPP)
- MODIS Terra corrected reflectance, true colour
- VIIRS Suomi NPP corrected reflectance, true colour
- MODIS Terra land surface temperature, day
- MODIS Terra snow cover (NDSI)
- GHR SST MUR sea surface temperature
- GHR SST MUR sea surface temperature anomaly
- IMERG precipitation rate (GPM)
- ASTER GDEM colour shaded relief

Switch product by voice or from the panel. Each one's legend prints its units and scale in real values, tiles are cached to a byte budget, and a tile that genuinely failed shows a hatch rather than a stretched neighbour.

The sun is computed, not painted

A true subsolar point drives a real directional light. Rayleigh, Mie and ozone scattering are ray-marched for the atmosphere; the terminator is soft; VIIRS night lights come up on the dark side; the ocean carries sun glint. Scrub the clock and the world turns under you.

Earthquakes

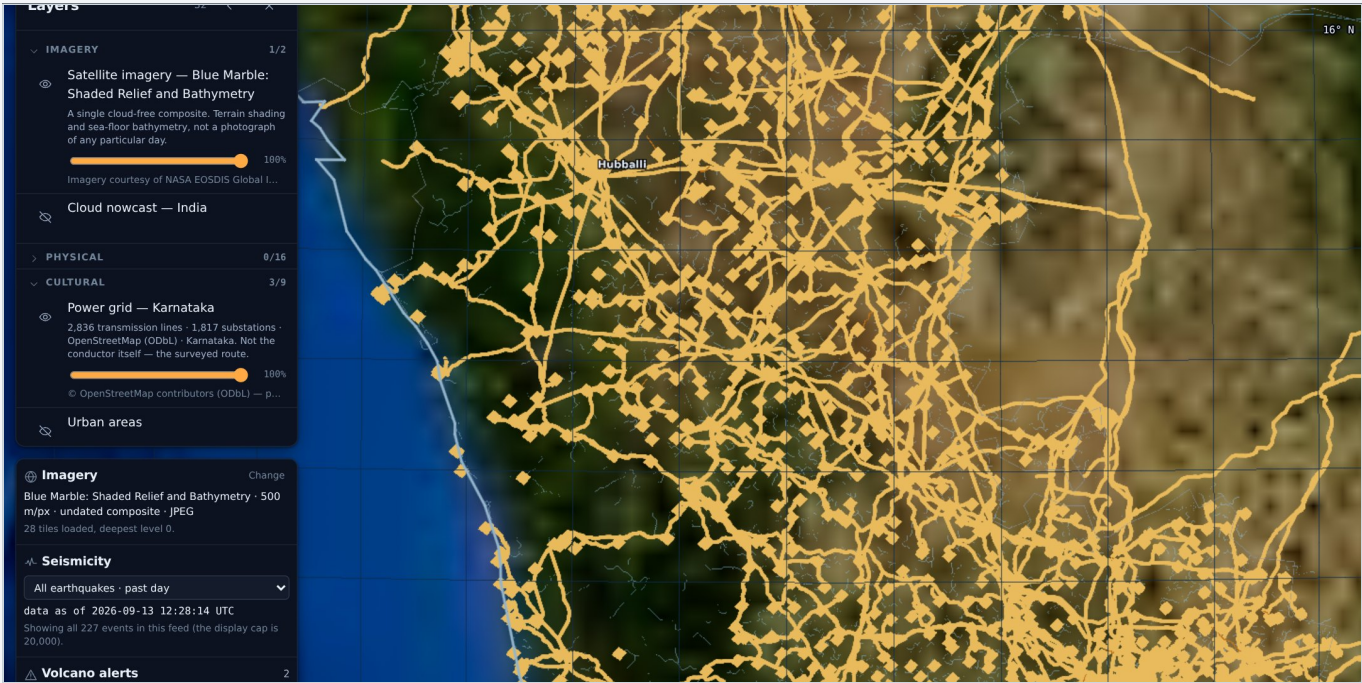
USGS feeds by magnitude and period, marker size proportional to the square root of energy, colour by depth, and each event placed below the surface at its true depth.

Volcano alerts

The USGS elevated-alert list, labelled for exactly what it covers.

ISS

Ten positions behind and ten ahead, each computed for its instant. The half in front is labelled a prediction.



basis live build, 13 Sep 2026, 520 km over Karnataka. The dock at left prints the imagery product in use and the data-as-of time of every live pane.

Everything on screen has a line in the attribution panel, and the panel is burned into every export

Data

- Natural Earth 1:50m and 1:10m, public domain: countries, states, coastline, rivers, lakes, places, and the eight optional layers.
- NASA GIBS, EOSDIS Worldview imagery products, under NASA's open data terms.
- USGS earthquake and volcano feeds; [wheretheiss.at](https://www.wheretheiss.at) for ISS fixes.
- OpenStreetMap contributors, ODbL: roads, hospitals, aerodromes, power lines and substations.
- HydroSHEDS HydroRIVERS; Hi-MAG glacial lakes (Chen et al. 2021); gridfinder (CC BY 4.0); DGCA drone zones via DroneGenie; AgriAtlas masks.

Code

- Three.js, MediaPipe Tasks Vision, geotiff.js, vosk-browser, Kokoro: all vendored, all committed, hashes recorded.
- Only openly licensed imagery is used as a default basemap.

Deployment

A directory of files behind any static server, on your infrastructure or ours. The reference instance runs behind a credentialed gate on aipower.guru with a read-only, allow-listed proxy for private rasters. Every deploy passes the test gate first and keeps a dated backup.

Verification

Thirty-five test suites cover geodesy, packing, picking, search, choropleth, gestures, voice grammar, deep zoom and a browser run that switches on every layer against the live build.

On the roadmap

Sentinel-2 10 m imagery as an open basemap, OpenStreetMap vector tiles served from your own extract for crisp detail below 13 km, and a corridor-risk view over the power grid.

See it on your own data

info@aionpl.com | aipower.guru/terralens

